TACOM

Lethality, Survivability, Mobility and Sustainment for America's Army

Army-Led, Joint Non-Lethal Weapons

Crowd Control & Area Denial to Vehicles Concept Exploration Programs

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OUTLINE

- DoD NLW Policy
- Organizations and Roles
- Joint Mission Area Analysis
- Concept Exploration Programs
  - Crowd Control
  - Area Denial to Vehicles
- CEP Process & Challenges
- Conclusion

Why Non-Lethal?

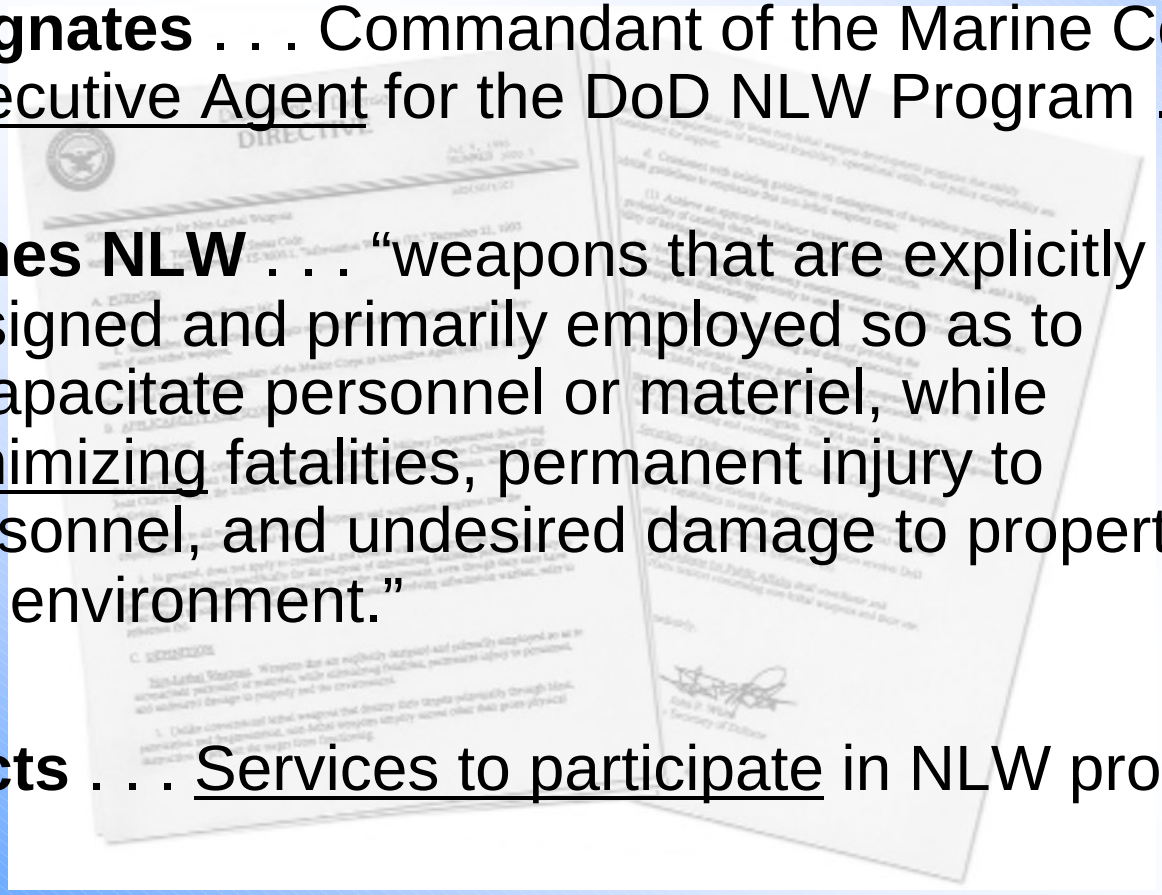
DoD Directive 3000.3, 9 Jul 96

Policy for Non-lethal Weapons (NLW)

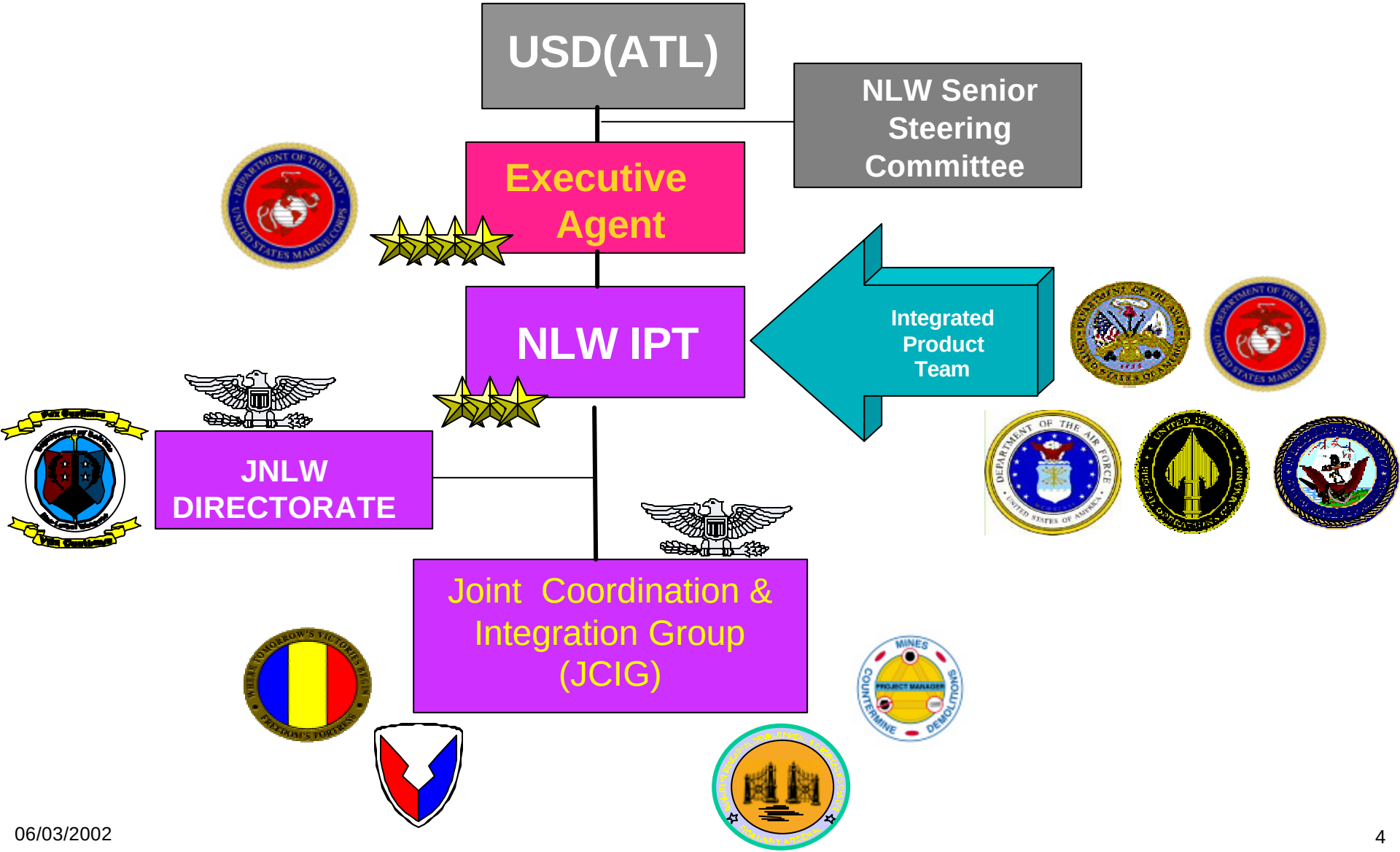
. . . **Designates** . . . Commandant of the Marine Corps Executive Agent for the DoD NLW Program . .

. . . **Defines NLW** . . . "weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment."

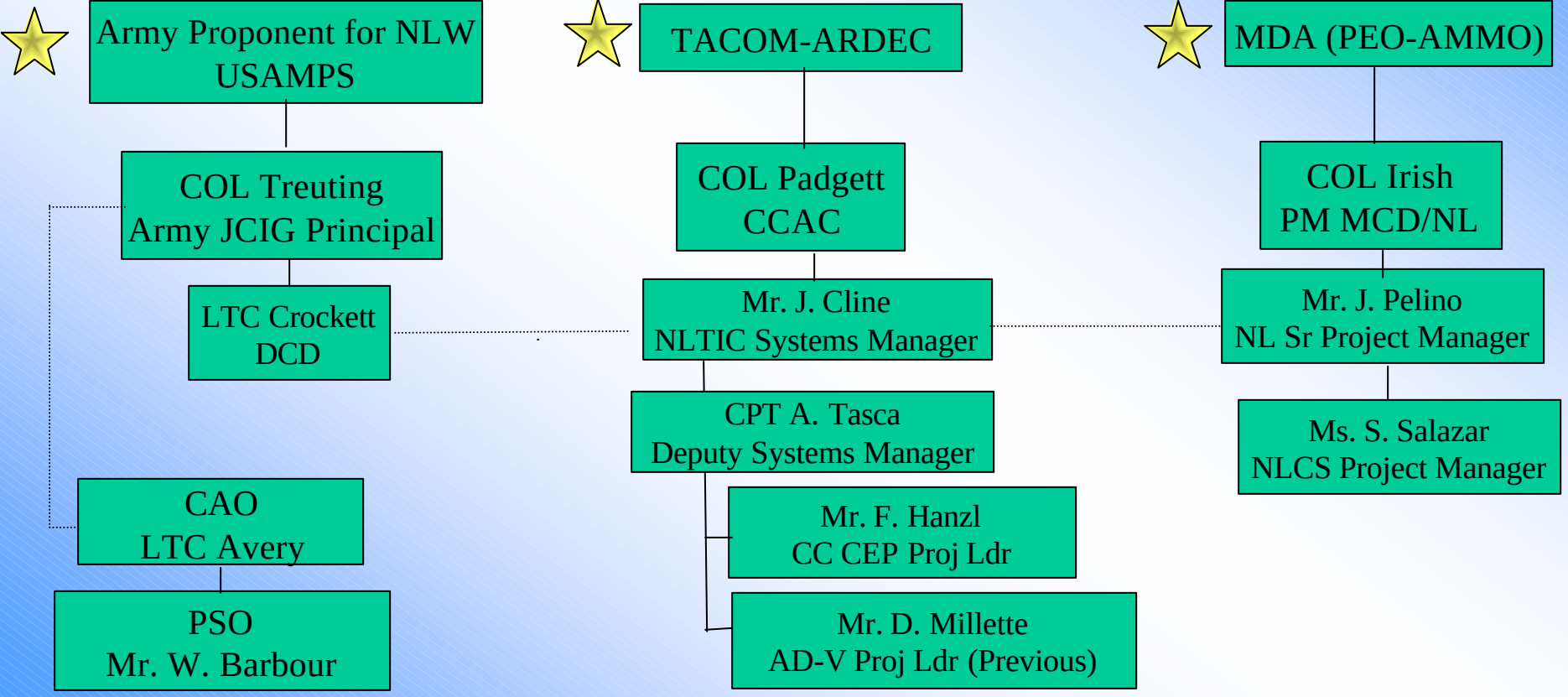
. . . **Directs** . . . Services to participate in NLW program



DoD Joint Non-Lethal Weapons Program



Army NL Organizational Structure



DoD Joint NLW
Core Capabilities & Functional Areas
- Joint Mission Area Analysis (JMAA) -

DOD 3000.3: Policy for Non-Lethal Weapons - "NL Weapons are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment."

Counter-Personnel*

- *Crowd Control*
- Incapacitate Ind'l Personnel
- Denial of Area to Personnel
- Clear Facilities & Structure of Personnel

Counter-Materiel*

- *Area Denial to Vehicles*
- Disable/Neutralize Equipment

*** Functional Areas / Tasks Prioritized by <u>all</u> CINCs at 1996 DoD NLW User's Conference; Joint Concept for NLW's & Per JMAA Jan 2000**

Crowd Control CEP

USER PAYOFF -Primary Mission Tasks

- Contain or stop the crowd from advancing
- Disperse a crowd between 50-1000 meters
- Direct the crowd movement
- Isolate specific individual(s) within a crowd
- Separate Belligerents
- Disperse a crowd within 0-50 meters

DESCRIPTION

- Joint NLWP formal Phase A CEP assigned to Army as lead
- Identify, analyze and evaluate alternative concepts that satisfy selected NL Crowd Control mission tasks

MILESTONES

MNS approved	Oct 96 (Army)	☑
	Mar 96 (USMC)	☑
Joint MNS (draft)	pending	☐
Milestone A	2QFY01	☑
Phase A Decision Rev	3QFY03	☐

Crowd Control CEP
Program Description

Program Description: Identify, develop, and evaluate alternative system concepts that satisfy the jointly scoped mission tasks of the Crowd Control NL functional area.

Primary Mission Tasks:

- Contain or stop the crowd from advancing
- Disperse a crowd between 50-1000 meters
- Direct the crowd movement
- Isolate specific individual(s) within a crowd
- Separate Belligerents
- Disperse a crowd within 0-50 meters

Secondary Mission Tasks:

- Resolve "Human Shields" situations
- Channelize or isolate the crowd
- Tag/Mark the crowd from the ground

Crowd Control CEP
Operational Context & Capabilities

CROWD CHARACTERISTICS

- Crowd Size
- Crowd Motivation
- Crowd Composition
- Crowd Concentration & Area
- Crowd's Armament

OPERATIONAL CAPABILITIES

- Effectiveness
- Length of Effectiveness
- Speed of Effectiveness
- Weight
- Range
- Accuracy

CC CEP Operational Context
Crowd Characteristics

- **Crowd Size**: A group of 30 to 1000 people

- **Crowd Motivation**: Motivation is considered more significant than numerical size of a group.

  Four levels of crowd motivation to be considered:

  - **Casual** - No common bond within the crowd, requires space and people (i.e. outdoor mall)
  - **Sighting** - Similar to Casual Crowd, both have the two elements of people and space, requires a third element- an event. (i.e. fire, crime, accident, concert, ball game)
  - **Agitated -** Elements of a Sighting Crowd, but includes the element of a heightened state of emotion.
  - **Mob -** Has the elements of people, space, event, emotions, and physical activity, but is characterized by hostility and aggression.

- **Crowd Composition**: A representative figure for the composition of a crowd is 70% male/30% female with all age groups, to include minors reflected.

CC CEP Operational Context
Crowd Characteristics (cont)

- **Crowd Concentration & Area**: The concentration or number of people per square meter (m^2).

  Three categories designed on the basis of the density of people per square meter:

  - **Light Crowd** — 1 person per square meter
  - **Medium Crowd** — 3 people per square meter
  - **Heavy Crowd** — 4 people per square meter

  The area can be as small as 25 m^2 for a heavy crowd of 100 people to as large as 1000 m^2 for a light crowd of 1000 people.

- **Crowd's Armament**: Crowds will be armed with objects readily at hand including metal shields (garbage can lids) for defense and rocks, pipes, bats, and molotov cocktails as offensive weapons. The presence of armed militants is a separate consideration.

CC CEP Operational Characteristics

- Effectiveness:
  - Not applicable against a casual crowd.
  - Shall influence 99% of the sighting crowd.
  - Shall influence 85% of the agitated crowd.
  - Shall influence 80% of the mob crowd.

- **Length of Effectiveness**: Minimum effectiveness is not less than 10 minutes, but desired effectiveness of 12 minutes or longer. Injuries requiring prolonged or extensive medical treatment must be excluded.

- **Speed of Effectiveness**: Preference is for near instantaneous effect and minimizing onset time is critical. For guidance an interim goal is three (3) minutes.

CC CEP Operational Characteristics (cont)

- **Weight**: For systems, minimizing weight must be considered with a goal of:
  - not heavier than 35 pounds for man portable items
  - no more than 1100 pounds for HMMWV
  - no more than 2500 pounds for HMMWV trailer

- **Range**: Desired effective range is:
  0-100 meters for point engagement
  50-1000 meters for area targets

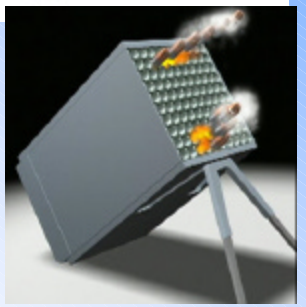
- **Accuracy**:
  - For a point engagement capability, selected target must be engaged at ranges up to 100 meters with 95% or greater probability of hit, excluding human factors.
  - For an area engagement capability, +/- 25 meters from point of impact is the goal if appropriate.

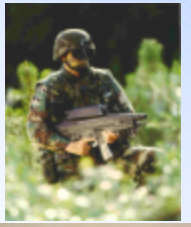
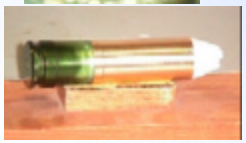
Example CC CEP Candidate Technologies

- Barriers
- Sound
- Air Vortices
- Temperature
- Water
- Visual Dazzlers (Light, Lasers
- Chemicals:
  - RCA Type (Malodorants, Irritants, etc.)
  - Other (Anti-Traction Materials)
- Directed Energy (Laser, Millimeter Wave)
- Electric Stun
- Enhanced Blunt Impact
- Combined Effects (Multi-Sensory, Flash/Bang, etc.)
- Legacy & Objective Force Delivery Platforms

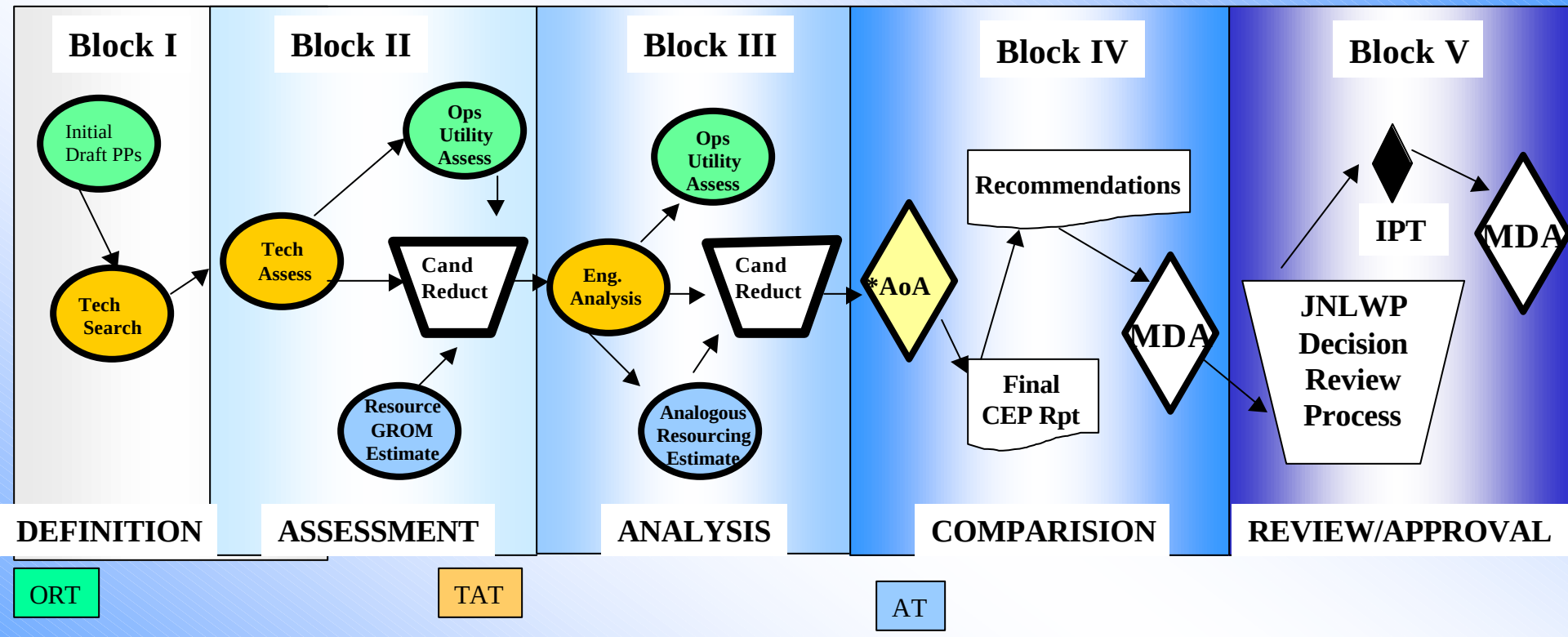
  M16/ M4, M203, MK19, 60 & 81mm Mortars, etc.
- Other Platform Capabilities (Robots, UAV/UGVs)




Generic CEP Process (CC & AD-V)



***AoA (Analysis of Alternatives) or Analysis of Multiple Concepts (AoMC)**

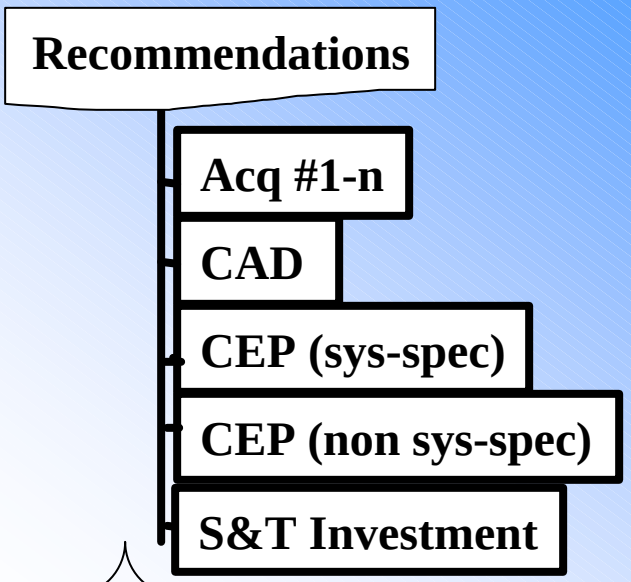
CEP Teams & Deliverables

Operational Requirements Team

- Operational Concept
- Desired Performance Characteristics
- Simulation Support Plan
- Performance Parameters
- Initial Key Performance Parameters
- Scenarios/Vignettes
- Measures of Effectiveness (MOE)
- Operational Utility Analysis
- Threat Assessment Report
- Draft Operational Requirements Document

Technical Architecture Team

- BAA & MS A package
- Measures of Performance (MOPs)
- M&S Study Plan - Feeder Data
- Preliminary Human Effects Assessment
- Technical Risk Identification & Mitigation
- Technology Search, assessment and analysis of candidate systems



Acquisition Team

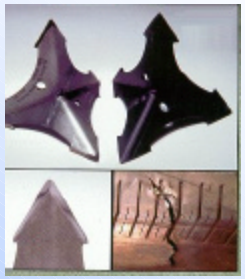
- Resource Estimation Reports
- Draft Acquisition Program Baseline
- Draft Acquisition Strategy Report
- Life Cycle Cost Estimates
- Prelim Test and Evaluation Master Plan
- Exit Criteria
- Preliminary Legal Review
- Programmatic Risk Management Plan
- Integrated Program Summary

Crowd Control CEP Challenges

- **Human Effects / Effectiveness**
  - Quantification & Validation of Target Effects on Humans of Candidate Technologies
    - Population Variation (Degree of Susceptibility)
  - Measurement & Determination of Operational Effectiveness.
- **Modeling & Simulation of Crowd Behavior / Response to Crowd Control Concept Systems**
  - Motivation Levels
  - Crowd Dynamics
- **Scenario Dependency**

Area Denial-Vehicles CEP




USER PAYOFF

Primary Mission Tasks

- Deny an area to land vehicles
- Stop a vehicle-urban/suburban environment
- Channelize vehicles
- Stop a vehicle-open/rural environment

DESCRIPTION

- Joint NLWP formal Phase A CEP assigned to Army as lead
- Identify, demonstrate, and evaluate alternative concepts that satisfy NL Area Denial to Vehicles mission tasks
- Not limited to pre-emplaced systems

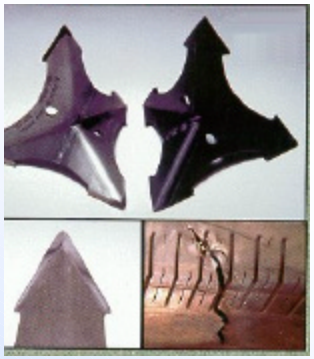
MILESTONES

MNS approval	FY96	☑
Joint MNS (draft)	pending	
Milestone A	2Q FY01	☑
Phase A Decision Rev	3QFY03	☐

Area Denial to Vehicles CEP
Desired Operational Capability Parameters

- Area (Perimeter Distance, 5km Max)
- Target
  - Combat Vehicles
  - Large Vehicles (Up to 80,000 lbs)
  - Small Vehicles (< 8,000 lbs)
- Effectiveness
  - Breach Prevention with 90% probability up to 20 minute delay
- Speed & Duration of Effectiveness
- Sensory System
  - Alert Operators to Breach
- Operational Range
  - 0-300 meters (T)
- Emplacement Time
- Cyclic Engagement Rate
- System Weight
  - Man Portable (<35 lbs)
  - HMMWV Mtd (<1100 lb)
  - HMMWV Towed (< 2500 lb)
- Logistic Considerations
- Environmental Considerations
  - No lasting effects from use
- Reversibility of Effect(s)
- Avoidance of Collateral Damage & Fratricide
- Resistance to Countermeasures

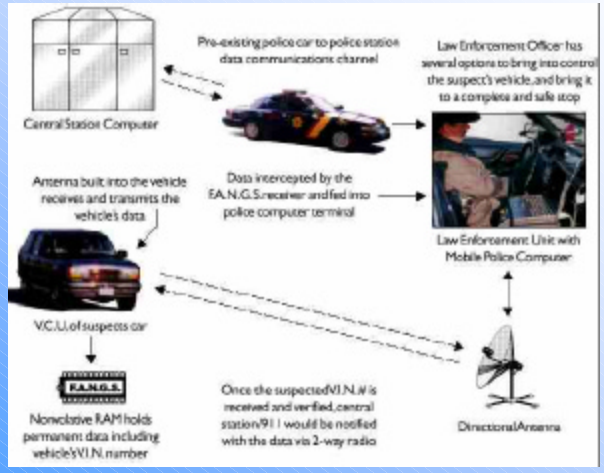
Example Non-Lethal AD-V Candidate Technologies



Caltrops

M1, Portable Vehicle Arresting Barrier, (PVAB)

Standoff Radio Frequency Ground Vehicle Stopper (ARL)



Example "Cooperative System" -Frequency Activated Neutralizing Generator System (FANGS)

Anti-Traction Material (USMC)

Fire Support Standoff Delivery Platform (w/ NL AD-V Payload)

Advanced Tactical Laser

AD-V CEP Challenges

- **Human Effects / Effectiveness**
  - Quantification & Validation of Target Effects on Humans resulting from use of potential Candidate Technologies
  - Measurement & Determination of Effectiveness

- **Scenario Dependency**
  - Class of Vehicle (Military / Commercial), Speed & Weight of Vehicle, Vehicle Prime Mover (Diesel, Combustion, Electric, Hybrid)
  - Terrain (Sand, Asphalt, Concrete, Icy Road, Urban vs. Rural Env't))
  - Collateral Damage (Uncontrolled Stops, Vehicle Fratricide, Self-Contamination)

- **Apparent Technology Limitations to Address Apparent Void for "<u>Ideal</u>" Operational Capability:**

  Portable, Hand-Held, Vehicle Stopper with Standoff Capability to Instantaneously Stop All Moving Vehicles with Reversible, NL Effects without any Collateral Damage or Environmental Degradation.

Summary

- **Numerous Urgent Fieldings have led to 1st Generation Crowd Control & Area Denial to Vehicles materiel items currently, or soon to be, in the Service's Non-Lethal Capabilities Sets**
  (*e.g., Blunt Impact Munitions & Caltrops*)

- **The JROC Approved DoD NLW JMAA conducted by the JNLWP is basis for the formal Concept Exploration Programs**

- **Purpose of CC & AD-V CEP's is determination of viable 2nd & 3rd generation NL Capabilities for Joint Service use**

- **CEP's are following JNLWD CEP Guide (Update in Process)**
  - **All CEP's affected by DoD 5000.2 Rewrite**

- **CEP's can result in any number of recommendations:**
  - **S&T investment is required;**
  - **Component Advanced Development is needed;**
  - **Mature technology with improved capability identified , Acquisition program(s) are recommended**

Back-Up Slide

CEP Decision Support Analysis (DSA) Process

- Decision Support and Analysis (DSA) process is being used in support of the NLW CC & AD-V Analysis of Aternatives (AoA) / Analysis of Multiple Concepts (AoMC)
  - First, a basic decision model or tree is developed;
  - Measures of Performance (MOP) & MOEs are developed by the Users.

- Models & Criteria definitions are established & agreed. A pair wise comparison of the criteria with respect to user "requirements" is conducted.

- The pair wise comparison is the heart of the DSA as it allows each service to define key issues, through open floor discussions, and place greater weight on the most important Measures of Performance and Measures of Effectiveness.

- All Information feeds into Analysis of Multiple Concepts. AoA/AoMC is not stand-alone at this early stage of CE since Performance Data is typically not sufficiently quantified , nor validated.